

MSS/CSS Hardware Design Review

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Overview



- **Driving Requirements**
- **Sizing Approach**
- **Hardware Configuration**
- **Capacity Breakpoints**
- **Failure & Recovery**

Driving Requirements



<u>Number</u>	<u>Summary</u>	<u>MSS H/W Impact</u>
EOSD 0030	Archive of EOS and related non-EOS data	Sizing assumptions of management data and products holdings
EOSD 3200	Minimum one backup in separate physical location for ECS software and key data items	MSS database partitioning/replication schemes
EOSD 3700	ECS functions Ao of 0.96 and MDT of four (4) hours	Overall RMA design of hardware strings
EOSD 4030	SMC function Ao of .998 and MDT of 20 minutes	Overall MSS design of EMC and LSM
SMC-0300	100 percent growth in SMC processing speed without modifications or upgrades to software	Sizing and scalability
SMC-0310	100 percent growth in SMC storage capacity without modifications or upgrades to software	Sizing and scalability

Driving Requirements



- **Primary Software Implementation Drivers**
 - **Heavily COTS Driven**
 - **Operational Use/Human Factors**
 - **Push/Pull Loads**



Sizing Approach

- **Evaluate Server/Workstation Loads**
 - Estimate the number of managed log entries
 - Determine the number of HP Openview data collections
 - Benchmark COTS or refer to vendor provided information
 - Benchmark custom code or analyze based on SLOC estimates
 - Size based on operator projected usage (i.e., HPOV & Tivoli)
- **Determine Storage Requirements**
 - Estimate contents/size of logs, troubletickets, change requests, fault/performance notifications, etc.
 - Size for 14 day active storage

Sizing Approach (GSFC DAAC)



MSS/CSS Server Load Sources

<u>Sources</u>	<u>CPU % Utilization</u>	<u>RAM</u> (MB)	<u>Application</u> <u>Disk Space</u> (MB)
HPOV & DCE Client*	20	96	2,000
HPOV Data Collection*	2	16	
Sybase Server & Client*	14	96	1,000
Tivoli*	12	64	100
Remedy*	7	32	50
Accugraph*	2	8	50
MDA (log conv. to Sybase)	18	96	
MSS Agent*	1	4	
DCE Server*	2	32	200
Word Processor	.3	1	20
Spreadsheet	.3	1	20
Other Services (mail, ftp)*	2	8	40
Total*	62%**	356	3,390
<p>* These items were considered to be potentially active at the same time. For example, Tivoli and HPOV work interactively to build maps, monitor parameters, set thresholds and execute scripts. MDA database update is assumed to be run in off-peak hours, and not concurrently with Sybase report generation functions.</p> <p>** Based on two PA-7200 processors</p>			



Sizing Approach

Tivoli Benchmark

Machine-HP 9000 J210/1
RAM-256 MB, CPU 176 MIPS
One User

<u>Test</u>	<u>CPU %</u>	<u>I/O (KB/s)</u>	<u>Disk Space (MB)</u>
Initialization	2	10	1.5
TME GUI Selected	9	17	2.5
Policy Region Desk Enable	11	43	10
Multiple Screens Open	11	37	15



Sizing Approach

Remedy Benchmark

Machine-HP 9000 735
RAM-256 MB, CPU 120 MIPS
Multiple Users

<u>Test</u>	<u>CPU %</u>	<u>I/O (KB/s)</u>	<u>Resident Memory (MB)</u>
Initialization	7	5	1.3
Log On	3.2	<20	1.6
Open Schema	2.5	<20	1.5
Open Preference Window	1.1	<20	1.7
Browse Data Base (50 tickets)	6		
Troubleticket Submittal	1		
Troubleticket Assignment	6		



Sizing Approach (GSFC DAAC)

MSS CM Workstation Load Sources

<u>Sources</u>	<u>CPU % Utilization</u>	<u>RAM</u> (MB)	<u>Application Disk Space</u> (MB)
ClearCase & Op Sys *	13	32	3,000
DDTS*	5	16	50
Software License Management*	5	8	50
XRP*	4	8	100
Tivoli Client*	3	8	50
Sybase Client*	4	8	50
Word Processor	1	4	20
Spreadsheet	1	4	20
Graphics	1	4	20
ILM Management*	5	16	50
MSS Agent*	1	4	20
DCE Client*	3	8	50
B&A Client*	5	16	100
Other Services (mail, ftp)*	3	8	40
Total*	51%	108	3,470
* These items were considered to be potentially active at the same time			



Sizing Approach

DDTS Benchmark

Machine-Sun 20/50
RAM-64 MB, CPU 130 MIPS
Multiple Users

<u>Test</u>	<u># Records</u>	<u>CPU %</u>	<u>Memory %</u>	<u>I/O (KB/s)</u>
CCR Submittal/ creation	-	1.4	6.6	4
CCR Registration	-	2.3	7.1	4
EP4 db query	128	9.7	7.2	11.3
EP6 db query	279	13.5	7.3	11.7
EP4 & EP6 db query	407	16.5	7.5	11.8
DDTS (inclusive) db query	1232	30.8	7.5	12.2

Sizing Approach (GSFC DAAC)



RAID Storage*

<u>Data Storage</u>	<u>Freq of Events per Hour</u>	<u>Size in Bytes per Trans</u>	<u>Size in Bytes Xmitted per Hr</u>	<u>14 Day (MB) Storage</u>
HP Openview Datastore	242,000	5	1,210,000	407
Application log files	99,000	420	41,580,000	14,000
Sybase DBMS				31,000
Tivoli	1,500	256	384,000	130
Remedy	20	256	5,120	2
Application Disk Space Requirements				3,390
Total Storage				49,000 (approx)
* RAID is server attached only				



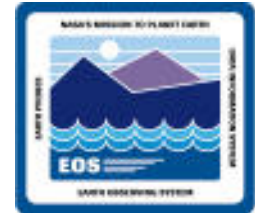
Sizing Approach

MSS Workstation #1 (CM) Storage

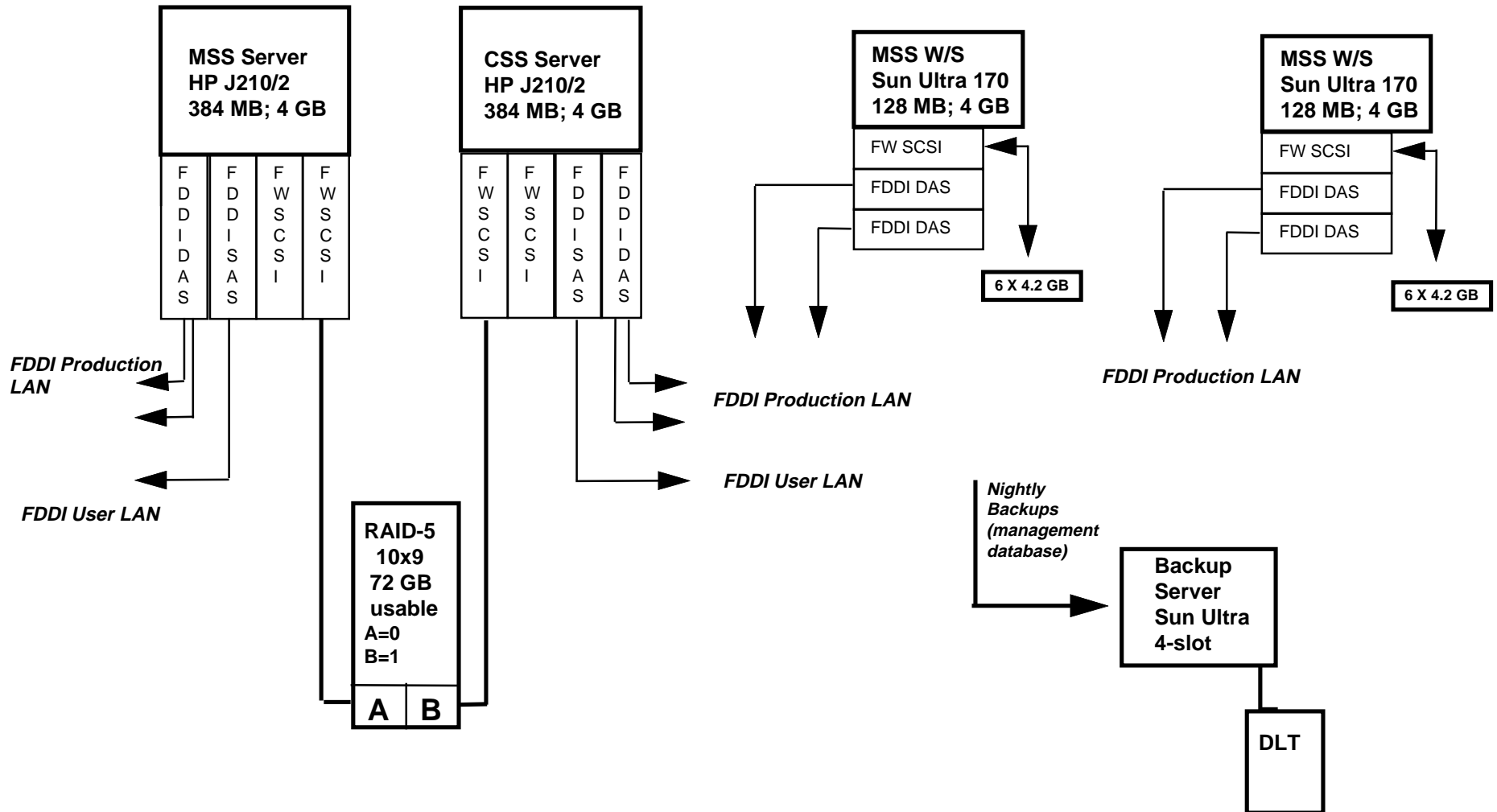
<u>Data Storage</u>	<u>14 Day Storage (MB)</u>
DDTS	10
ClearCase	4,000
Other Datastores (ILM, XRP, B&A client)	200
Application Disk Space Requirements	3,500
Total Storage	7,710

MSS Workstation #2 Storage

<u>Data Storage</u>	<u>14 Day Storage (MB)</u>
DBMS Report Gen	10
Other Datastores (B&A client, training, policy & procedures)	50
Application Disk Space Requirements	2,000
Total Storage	2,060



MSS/CSS H/W Configuration (GSFC DAAC)



Capacity Breakpoints



- **Parameters**

- **User requests**
- **Processing**
- **Level of monitoring**

- **Criteria**

- **Without adding a peripheral**
- **Adding only host-attached peripherals**
- **Adding additional hosts without changing software design**



Capacity Breakpoints (GSFC DAAC)

User requests - increase in log entries

- >5X requests; additional RAID partitions needed**
- >20X requests; additional RAID device needed**
- >70X requests; additional host needed (for I/O slots)**

Impact - Storage

Processing - increase in number of PGEs

- >2X # of PGEs; additional RAID partitions needed**
- >5X # of PGEs; additional RAID device needed**
- >15X # of PGEs; additional host needed (for I/O slots)**

Impact - Storage

Capacity Breakpoints (GSFC DAAC)



Level of monitoring - increase in number of MIB objects

>3X # of MIB objects; approach capacity for one CPU

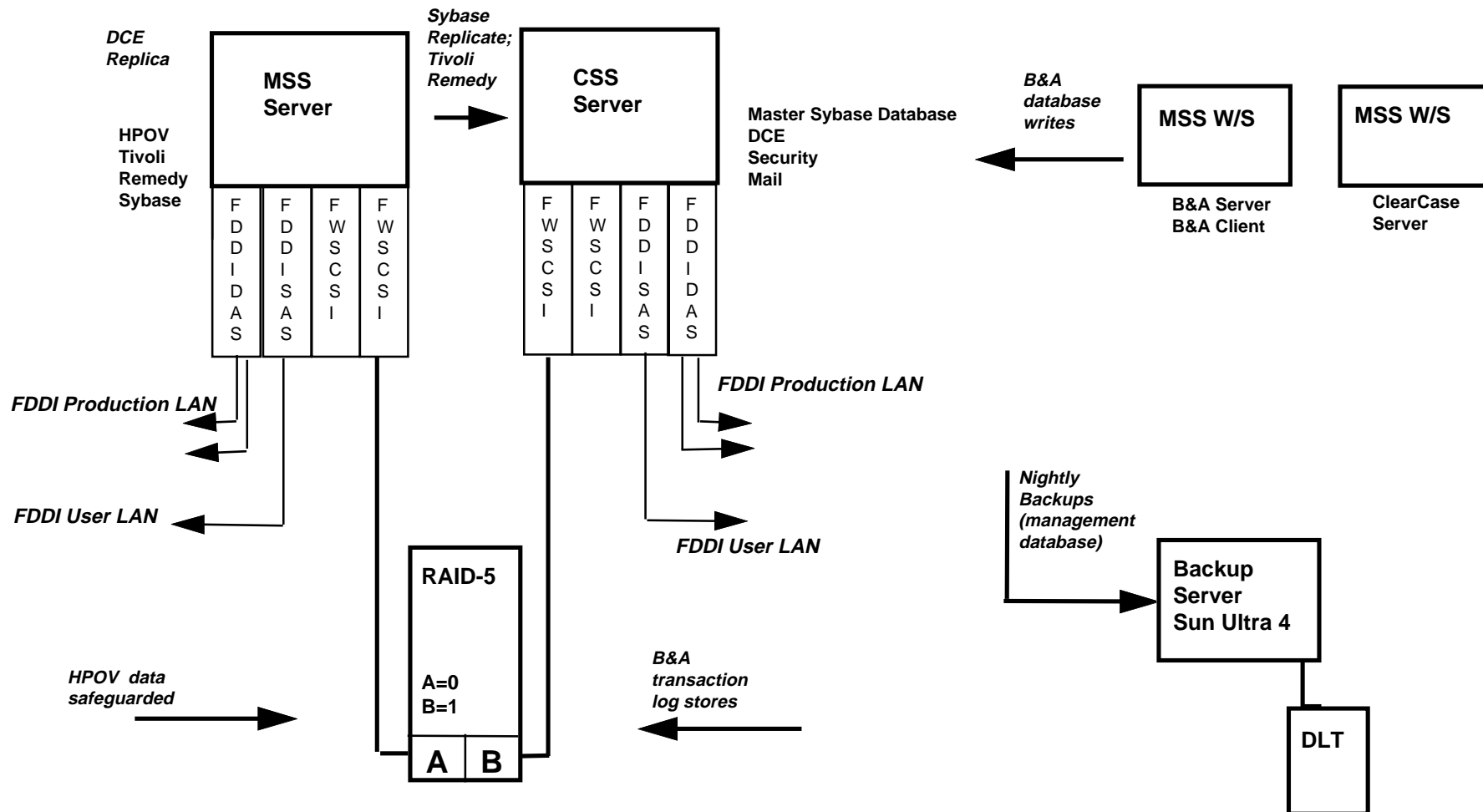
>13X # of MIB objects; additional host needed

(approach total processing capacity within host)

Impact - Processing



MSS/CSS H/W Failure & Recovery (GSFC DAAC)





Failure & Recovery

- **MSS/CSS server configuration provides warm standby redundancy**
- **Critical storage is cross-strapped in RAID for data availability**
- **Dual redundant Fast Wide SCSI-2 interfaces**
- **Operations not interrupted with single RAID 5 disk failure**
 - **Array performance degradation dependent on configured recovery time**
 - **Hot spare allows automatic recovery of single failed disk**
- **RAID device contains numerous redundant features**
 - **Dual controllers, hot swappable disks, power supplies and fans**

Failure & Recovery



- **DCE server functions and data replicated**
- **Critical Tivoli and Remedy real time data replicated by Sybase, safeguarded by RAID-5 and backed up daily**
- **HPOV real time data safeguarded by RAID-5 and backed up daily**
- **Billing & accounting transaction logs safeguarded by RAID-5 and backed up daily**
- **Management database data safeguarded by RAID-5 and backed up daily**